

SUPPLEMENTAL SECTION B-5
FISH AND WILDLIFE REPORT

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SUPPLEMENTAL SECTION B-5 FISH AND WILDLIFE REPORT

In this section, available information is presented on existing habitats, fish and wildlife occurring or potentially occurring in the vicinity of the proposed Phase II plant site, the potential for adverse impacts from Phase II development are evaluated, and the need for any mitigation measures is discussed. This section has the following organization:

- Fisheries and Aquatic Resources (B-5.1)
 - Affected Environment and Fisheries Resources
 - Evaluation of Potential Impacts
 - Mitigation Measures
- Wildlife Habitats and Resources (B-5.2)
 - Affected Environment and Wildlife Resources
 - Evaluation of Potential Impacts
 - Mitigation Measures

Special status fish and wildlife species occurring or potentially occurring in the project area are identified in their respective subsections.

B-5.1 FISHERIES AND AQUATIC RESOURCES

The Phase II project site is located 0.5 miles from the south bank of the Chehalis River approximately 0.5 miles southeast of the confluence with the Satsop River. The site is bordered on the east by Fuller Creek, a small tributary to the Chehalis. The creek is approximately 0.5 miles from the site. The Phase II plant will draw operational water from the Ranney Well field, located on the Chehalis River floodplain at Elizabeth Creek 4 miles to the west of the site. These waterbodies are used for spawning, rearing, and migratory habitat by a number of resident and migratory fish species, including salmonid species currently listed or proposed for listing under the Endangered Species Act (ESA). The mainstem Chehalis River, the source and outfall zone for process water to be used in the Phase II plant is an important migration corridor for several salmonid species.

Two categories of potential adverse impacts on these waterbodies from the proposed project were considered: impacts from construction, and impacts from plant operation following project completion. There are no predicted impacts on fisheries and aquatic resources from construction of Phase II. There are no aquatic resources on the Phase II site and no associated construction activities that will directly impact aquatic resources. Discharges from the site will utilize the

existing outfall structure and additional construction will not be necessary. An erosion and sediment control plan for Phase I construction has already been approved and implemented. This plan relies on standard construction best management practices and an existing surface water drainage system and retention basin. Phase II construction will also rely on this approved plan and the existing control structures. Therefore adverse impacts from construction are not considered further here.

Plant requirements for operational water supply and disposal will affect surface water quantity and quality in the Chehalis River. The Phase II plant will draw process water from the Ranney wellfield on the Chehalis River at a maximum instantaneous rate of 9.5 cubic feet per second (cfs). The wellfield lies on the floodplain of the river at the confluence of Elizabeth Creek, a small fish bearing tributary. In addition, potable water for the plant will be withdrawn from the Grays Harbor Public Development Authority (PDA) raw water well located near the confluence of the Satsop and Chehalis Rivers. Effluent process water will be discharged through an existing outfall structure adhering to the requirements of an approved NPDES permit. In this section, the potential for adverse impacts on aquatic species from operational water supply and disposal is evaluated.

The evaluation of potential adverse impacts on aquatic resources focuses on salmonids (salmon and trout), recognizing their cultural and economic importance, their role as keystone species in riverine ecosystems in the Pacific Northwest, and legal requirements for protection of listed species.

Data sources on area fisheries resources included U.S. Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW), Washington Department of Natural Resources (WDNR), Lewis County Conservation District (LCCD), monitoring program studies conducted for the Washington Public Power Supply System (WPPSS), and local fishery biologists. Fish species occurring in the vicinity were identified using the Salmon and Steelhead Stock Inventory (SASSI) (WDW 1992c), the Salmonid Stock Inventory (SaSI) updates for cutthroat and bull trout (WDFW 2000a, 1998b). More specific information on fish distribution was derived from the then-named Washington Department of Fisheries (WDF) stream catalog (WDF 1975), used to locate cascades and falls, Washington Rivers Information System (WARIS) maps (WDW 1992a), and the WDFW Priority Habitats and Species (PHS) and Species of Concern (SOC) lists. The PHS list is a catalog of habitats and species considered to be priorities for conservation and management. The SOC list includes just fish and wildlife species that are currently listed, proposed, or candidates for listing at state and federal levels. This information was used to identify occurrence of species currently considered priorities for protection and management at state and federal levels, and the presence of habitats of specific concern.

B-5.1.1 Affected Environment and Fishery Resources

The Chehalis River basin is the second largest watershed in the state of Washington after the Columbia River (Seiler 1989). The river arises near the town of Pe Ell, Washington, and flows in a northerly direction before turning to the west. The river enters Grays Harbor near the town of Aberdeen. Grays Harbor, the fourth largest estuary in the western United States, is important habitat for a number of marine, anadromous, and estuarine species. Forestry, farming, and related industries are the principal forms of land use in the Chehalis basin. Habitat loss and degradation resulting from these and other land uses has resulted in a decline in the diversity of aquatic species in the basin. The mainstem of the Chehalis River is prone to poor water quality conditions, specifically high summer water temperatures and low dissolved oxygen (DO) levels, as well as fecal coliform contamination (LCCD 1992a, 1992b). In spite of these limitations, the Chehalis River main stem is rated a Class A (excellent) waterbody by the Washington Department of Ecology. The majority of tributary watersheds are rated Class A or Class AA. Beneficial uses of Class A and Class AA waters include water supply, fish spawning and rearing, recreation, and navigation (LCCD 1992a, 1992b).

The Chehalis River in the vicinity of the Phase II site is a low gradient, meandering system bordered by a variety of wetland habitats. The wetland habitats are identified as priority habitats on the state PHS list (WDFW 2000b). In addition, there are a number of tributary watersheds ranging in size from small ephemeral creeks to large river drainages. Riparian habitats in the vicinity of the Phase II site are also identified as priority habitats. The Chehalis basin is known to support populations of seven anadromous fish species, as well as a number of native and introduced resident fish species. These include several stocks of chinook (spring, summer, and fall races), coho and chum salmon, coastal cutthroat and steelhead trout, and river and Pacific lamprey. Bull trout and possibly Dolly Varden, collectively known as native char, have been observed in the basin but the presence of self-sustaining populations has not been confirmed. However, the USFWS considers the Chehalis basin to be habitat for both species, which are currently listed and proposed for listing as threatened under the ESA, respectively. Pink and sockeye salmon have also been infrequently observed in the basin, but are most likely strays from other coastal watersheds and are not considered representative of a self-sustaining population (WDF 1975). Therefore these species are not considered further here.

A listing of resident and anadromous fish species occurring in the Chehalis River basin is provided in Table B-5-1. Species that are currently on or under consideration for the ESA or state endangered, threatened, or species of concern lists are identified. Additional information on fish species occurring or potentially occurring in the vicinity of the Phase II site and typical habitat use is provided below.

Table B-5-1
Fish Species Occurring or Potentially Occurring in the Vicinity of the
Phase II Site and Current Federal and State Status

Common Name	Scientific Name	Federal Status ^(a)	State Status ^(b)
Anadromous Fishes			
Chinook Salmon	<i>(Oncorhynchus tshawytscha)</i>	-	-
Coho Salmon	<i>(Oncorhynchus kisutch)</i>	SC	-
Chum Salmon	<i>(Oncorhynchus keta)</i>	-	-
Steelhead Trout	<i>(Oncorhynchus mykiss)</i>	-	-
Coastal Cutthroat Trout	<i>(Oncorhynchus clarkii clarkii)</i>	PT	-
Bull trout	<i>(Salvelinus confluentus)</i>	T	C
Dolly Varden	<i>(Salvelinus malma)</i>	PT	-
Pacific Lamprey	<i>(Entosphenus tri)</i>	SOC	-
River Lamprey	<i>(Lampetra ayresi)</i>	SOC	C
Resident Fishes			
Cutthroat Trout	<i>(Oncorhynchus clarkii)</i>	PT	-
Bull Trout	<i>(Salvelinus confluentus)</i>	T	C
Dolly Varden	<i>(Salvelinus malma)</i>	PT	-
Largemouth Bass	<i>(Micropterus salmoides)</i>	-	-
Sculpin	<i>(Cottus spp.)</i>	-	-
Threespine Stickleback	<i>(Gasterosteus aculeatus)</i>	-	-
Olympic Mudminnow ^c	<i>(Novumbra hubbsi)</i>	-	S
Northern Squawfish	<i>(Ptychocheilus oregonensis)</i>	-	-
Speckled Dace	<i>(Rhinichthys osculus)</i>	-	-
Redside Shiner	<i>(Richardsonius balteatus)</i>	-	-
Bridgelip Sucker	<i>(Catostomus columbianus)</i>	-	-
Western Brook Lamprey	<i>(Lampetra richardsoni)</i>	-	-

- ^(a) Species currently listed or under consideration for listing under the Endangered Species Act, or otherwise of concern because of declining population trends and/or threats to habitat (NMFS 2001, USFWS 2001).

SOC = Federal Species of Concern

FT = Federal Threatened Species

PT = Federal Proposed Threatened Species

C = Federal Candidate Species

- = Not warranted or under consideration for listing

- ^(b) Species currently listed or under consideration for listing by Washington State. Based on data from Natural Heritage and Priority Habitats and Species databases, WDNR 2001 and WDFW 2001.

E = State Endangered - A species, native to the state of Washington, that is likely seriously threatened with extirpation throughout all or a significant portion of its range.

T = State Threatened - A species, native to the state of Washington, that is likely to become endangered in the foreseeable future throughout a significant portion of its range within the state without cooperative management or the removal of threats.

Table B-5-1 (Continued)
Fish Species Occurring or Potentially Occurring in the Vicinity of the
Phase II Site and Current Federal and State Status

C = State Candidate - A species that is under review for possible listing as endangered, threatened, or sensitive.
S = State Sensitive - A species native to the state of Washington that is vulnerable or declining and likely to become endangered or threatened throughout a significant portion of its range within the state without cooperative management or removal of threats.
- = Not warranted or under consideration for listing

B-5.1.1.1 Fish Species Present in the Vicinity of the Site

Chinook, coho and chum salmon: Chinook and coho salmon stocks in the basin are generally of mixed native and introduced hatchery stock origin, although some chinook stocks remain entirely native. Chum stocks are entirely native. Chinook, and coho are supported by both wild and hatchery spawning. Returns of wild stocks of chinook and coho have been generally low for over 50 years (Seiler 1989). In spite of low returns, individual stock statuses for these species were considered to be largely healthy in the 1992 SASSI inventory. Only the Satsop River summer run chinook were listed as depressed (WDW 1992c). Chum salmon stocks in the basin were considered to be healthy in 1992 (WDW 1992c), but have undergone recent declines. Chehalis coho are part of the Lower Columbia River/Southwest Washington population segment, which is currently a candidate for listing under the ESA.

Chinook salmon enter the Chehalis River from March through November, with fall chinook spawning mainly in areas downstream of Oakville (WDF 1975), a town about 39 miles south of Olympia. Portions of the fall run chinook salmon population spawn in the mainstem of the Chehalis River adjacent to the Phase II site. Spring chinook spawn primarily in the upper Chehalis River and tributaries such as the Skookumchuck and Newaukum Rivers. Fall chinook salmon fry remain in fresh water from 3 to 5 months, and spring chinook fry remain for more than 1 year (WDF 1975).

Coho salmon spawn in virtually all accessible streams in the Chehalis basin which offer suitable habitat, and juveniles use many non-spawning streams for rearing and refuge during high water periods (WDW 1992c; Bisson et al. 1982). Grays Harbor coho salmon runs enter fresh water beginning in September and continuing through February (WDF 1975). Juvenile coho salmon remain in fresh water for up to 18 months and utilize a variety of habitat types, including tributary streams and mainstem habitats. Mainstem habitats, particularly channel associated wetlands, become particularly important during later stages of rearing. The Fuller Creek watershed partially encompasses the Phase II site and the creek itself is located 500 feet from the eastern site boundary. The creek has supported a small run of coho salmon (107 spawning adults observed from 1987 to 1993) (WDF 1993). The watershed has been logged three times in recent

history and has suffered from resulting high levels of sedimentation, loss of pool habitat, and changes in channel configuration which have impeded fish migration.

Chum salmon spawning areas occur mainly in larger tributaries entering the north side of the Chehalis River, downstream of Cloquallum Creek (WDF 1975). The only stream within the study area with reported chum salmon use is the mainstem Chehalis River upstream of the project area (WDW 1992a). Chum salmon spend only a limited period of time in freshwater as juveniles and are not highly dependent on freshwater habitats.

Salmon produced in the Chehalis basin are harvested by sport, tribal, and commercial fishermen from northern California, Oregon, Washington, Canada, and Alaska (WDF 1975). From 1998 to 2000, combined commercial and tribal harvests averaged 18,500 fish total despite harvest restrictions to permit rebuilding of wild stocks (Pinney 2001). In the past, salmonid stocks, particularly coho salmon, were supported by high levels of hatchery production (Seiler 1989, WDF 1993). The level of hatchery production has declined in recent years to protect vulnerable wild stocks.

Steelhead and Cutthroat Trout

The Chehalis basin supports several distinct stocks of winter run steelhead, as well as a single stock of summer run steelhead. Steelhead stocks in the basin are of both native and mixed origin. Both the summer and winter run stocks are considered to be healthy, with the exception of the Skookumchuck/Newaukum winter steelhead stocks which are considered depressed (WDW 1992c). Cutthroat trout have been stocked in several tributary watersheds from the Black River to Grays Harbor and utilize virtually all suitable habitats that are accessible. The Chehalis stock of coastal cutthroat is considered to be of native origin supported by composite hatchery and wild production. The stock includes both resident, and anadromous components. The current status of the stock is unknown, but it is part of the Southwest Washington-Columbia River evolutionarily significant unit, which has been proposed for listing as threatened by the National Marine Fisheries Service (NMFS) and USFWS (WDW 1993, WDFW 1994, WDFW 2000a).

Both steelhead and cutthroat trout generally spawn in smaller tributary watersheds, although winter run steelhead spawn in areas of the main stem Chehalis River several miles upstream of the Phase II site. Both species transit the Chehalis main stem adjacent to the Phase II site on spawning migrations and juvenile out migrations. Both species spend at least one year rearing in freshwater and may utilize a variety of main stem and tributary habitats in the vicinity of the project site at various times of the year. Both species are considered to be excellent game fish and are regularly targeted by sport fishers. In the 1997-98 season, 484 summer run and 1,406 winter run steelhead were taken in the Chehalis system (Pinney 2001). There are no current catch statistics for cutthroat trout.

Native Char (Bull Trout/Dolly Varden)

Bull trout and Dolly Varden, are both members of the genus *Salvelinus*, a group of trout-like salmonids that also includes eastern brook trout and lake trout. Bull trout and Dolly Varden are similar in appearance and have overlapping habitat requirements. Because they are difficult to distinguish in the field the two species are managed collectively as “native char” by WDFW (1998b), and Dolly Varden are proposed for listing as threatened by USFWS under the “Similarity of Appearance” provisions of the ESA to prevent accidental misidentification of threatened bull trout. The Puget Sound – Coastal Washington distinct population segment (DPS) of bull trout is currently listed as threatened under the ESA. Native char occurring in the Chehalis River basin have been identified as a distinct stock by WDFW (1998b).

Native char are generally associated with cold water mountain streams and lakes, and river systems fed by snowmelt. Spawning and incubation occurs in very cold water (4 to 9°C, 39 to 48°F). Spawning habitats in western Washington are usually found in low gradient reaches of snowmelt fed streams above 2,000 feet elevation. Rearing habitats generally have a temperature range of less than 15°C (59°F). Native char have long incubation periods and the juveniles spend an extended period of their development in association with the stream bottom. They require clean, sediment-free substrate, and an abundance of large woody debris for cover. These requirements make the species particularly vulnerable to habitat degradation from timber harvest, agriculture, grazing, and other forms of land use.

The majority of the Chehalis River basin is predominantly a low elevation, low gradient system with an unfavorable temperature regime and other habitat characteristics that are marginal for native char species. Although some native char may spend their entire lives as residents of small tributary watersheds the species are generally highly migratory, with populations traveling between spawning streams and large mainstem rivers (adfluvial populations) and lakes (lacustrine populations), as well as anadromous populations in coastal watersheds. Adult native char are primarily piscivorous (fish eating) and anadromous populations are known to forage in salmonid streams from fall through spring to feed on eggs and juvenile fish (Reiman and McIntyre 1993).

There is scant historical and current information about native char populations in the Chehalis basin, but available information indicates that current abundance is quite low. The current status is listed by WDFW as unknown (WDFW 1998b). Native char occurring in the basin have not been identified to species level. The Chehalis River basin is on the southern end of the range of the coastal distribution of these species and abundance may be naturally low. Observations in the basin have been distributed primarily downstream of and including the Satsop River, and the individuals observed have primarily been large adults captured by salmon and steelhead anglers. It is possible that adult char observed in the basin were foraging individuals from coastal rivers to the north with known anadromous populations (Quinnault, Hoh, and Queets Rivers).

Although suitable physical spawning habitat for native char may exist in the headwaters of the Humptulips and Satsop Rivers, only the Wynoochee River is fed by extensive areas of snowmelt and has a suitable temperature regime. A single juvenile char was reportedly observed in a WDFW downstream migrant trap at RM 50 in 1997, which could indicate a spawning population (WDFW 1998a). However, the accuracy of this identification has been questioned. Arctic char have been raised in private aquaculture operations in the mid-Chehalis basin in recent years, and these operations are prone to occasional escapees. Juvenile arctic char are similar in appearance to native char. The juvenile fish observed in 1997 is believed to have most likely been an escapee from one of these operations (Siller 2001).

Other Game and Non-game Fish

Other game and non-game fish in the Chehalis River basin include a mix of native and introduced species. Introduced game fish include largemouth bass and pumpkinseed (sunfish). Resident non-game fish include three-spine stickleback, Northern squawfish, dace, shiner, sucker, Olympic mudminnow, river lamprey, and Pacific lamprey. These species use a variety of habitat types throughout the basin, and are widely distributed. The introduced game fish are warm water species and tend to be distributed in slack water environments with warmer water temperatures. The Pacific and river lamprey are anadromous species that migrate to spawn in the same streams as the salmonid species they parasitize. The Pacific lamprey and the Olympic mudminnow are currently on the state Candidate list. The river lamprey is listed as a state Species of Concern.

B-5.1.1.2 Factors Influencing Fish Distribution and Abundance

Several existing factors limit the productivity of aquatic habitats in the Chehalis River and its tributary watersheds. The Chehalis River from its mouth upstream to the Newaukum River confluence, River Mile (RM) 75.4, is reportedly impaired by fecal bacteria, high stream temperatures, and low dissolved oxygen (DO) levels (LCCD 1992a). The entire Chehalis River basin is on the 303(d) list for water temperature. DO and temperature problems are most apparent upstream of RM20, ameliorated in downstream reaches by the influx of the Black and Satsop rivers (CBP 2000). The affected area for the Phase II project is downstream of this zone of significant impacts. From its confluence with the Satsop River upstream to the city of Chehalis, the river has a history of fish kills associated with high temperatures and low dissolved oxygen levels. Elevated temperatures (in excess of 18°C) have been measured throughout the Chehalis River system in most years, resulting in water quality problems that restrict anadromous fisheries in this basin (LCCD 1992a, 1992b). Elevated temperatures and depressed dissolved oxygen levels typically occur during the summer season (LCCD 1992a). Despite the limiting factors associated with water quality in the lower Chehalis River, better fisheries habitat is found in the area downstream of the confluence of the Black River (RM 47.0), as compared to the upper Chehalis basin (Seiler 1989).

Groundwater contamination is one source of water quality problems in the Chehalis basin. Groundwater helps sustain stream flow during low flow conditions, which typically occur during the summer months. Typical causes of ground water contamination include septic systems, agricultural waste (manure and pesticides), automotive waste, landfills, and industrial waste (LCCD 1992a). Contaminated ground water is probably a contributing factor in water quality impairment in the lower Chehalis River basin, with problem areas particularly evident in Grays Harbor County near Elma, upstream of the Phase II site.

In addition to water quality problems influenced by human activities, natural factors also limit the productivity of native salmonids in the Chehalis basin (WDF 1992). High occurrences of the diagenic fluke *Nanophyetus salmincola* are present in lower areas of the Chehalis River. Adult and juvenile salmon migrating through the lower reaches contract heavy infestations of this parasite. This condition increases physiological burdens on migrating fish, making them more vulnerable to poor water quality and other environmental stressors. Synergistic effects of parasitism and poor water quality are particularly evident in poor juvenile coho salmon survival (WDF 1992). Another factor that limits salmon production is the presence of a robust population of squawfish, in the lower Chehalis River and many of its tributaries, as well as introduced largemouth bass (WDF 1992). These species are known predators of juvenile salmonids.

Estuarine habitat quality may also adversely affect survival of salmon in the Chehalis basin, particularly for species such as fall chinook salmon which have a high degree of dependence on these habitats as rearing areas. The inner Grays Harbor area has degraded water quality (Berg and Northcoat 1985, Bjornn et al. 1974, Seiler 1989, WDF 1992). Coho salmon are less affected due to their lower degree of dependence on these habitats. Chum salmon are highly estuarine dependent as juveniles, but their survival appears to be less limited possibly due to estuarine residence when stream flows are higher and water quality in Grays Harbor is better (Seiler 1989, WDF 1992). As noted, degraded water quality and heavy parasite infestation cause high mortality in coho salmon smolts (WDF 1992).

B-5.1.2 Evaluation of Potential Adverse Impacts

B-5.1.2.1 Potential Plant Construction Impacts

As discussed in the introduction, there are no predicted impacts on aquatic resources from construction activities. The Certificate Holder will implement the already approved erosion and sediment control plan to avoid sediment releases into nearby streams. Discharges from the Satsop CT Project will use the existing outfall structure, and therefore, construction of an outfall will not be necessary. Thus, there will not be a significant adverse impact due to construction of the power plant.

B-5.1.2.2 Potential Operational Impacts

Process water supply and disposal for Phase II operation have the potential to affect surface water quality and quantity in aquatic habitats in the vicinity of the project site. Water to be used in the facility will be withdrawn from existing Ranney wells and transported to the site through an existing pipeline infrastructure system. Process water will be delivered to the plant site through a connection to the existing blowdown (outflow) line. The Phase II project will send its effluent back to the blowdown line via another connection downstream of the project intake. Effluent from the facility will be discharged through an existing outfall in the Chehalis River. The discharge will meet the limitations of the existing NPDES permit; however, the permit will be amended to include the wastewater discharge of the Phase II project. Potential impacts on aquatic habitats used by aquatic species, including special status salmonids are discussed below.

Process Water Supply

The alluvial aquifer in the Chehalis River valley, in which the Ranney wells draw water, is interconnected with surface water sources. The aquifer is recharged by winter flood flows and in turn provides baseflow to the Chehalis River during the summer low flow period. Because the Ranney wells draw on this interconnected surface water and groundwater environment, the well water is a mixture of surface water (88 percent) and groundwater (12 percent). The wellfield is located on the alluvial floodplain of the Chehalis River at the confluence of Elizabeth Creek. Phase I is authorized to use up to 9.5 cubic feet per second (cfs) from the Ranney wells, and the PDA has a permitted water right to withdraw an additional 20 cfs from the Ranney wells. The Certificate Holder is proposing to use up to the maximum 9.5 cfs of the PDA's permitted water right for Phase II.

Large withdrawals of surface water (reductions in water quantity) have the potential to adversely affect aquatic habitats and species if the wetted habitat area available for rearing and fish passage is significantly reduced. Similarly, large reductions in surface water flow have the potential to adversely affect water quality conditions. Specifically, water withdrawals that severely lower baseflows during lowflow periods can result in greater surface to volume exposure and unfavorable increases in stream temperature. It is desirable to examine this potential impact with regard to the middle reaches of the mainstem Chehalis River, which suffers chronically from summer water temperatures in excess of levels supportive of salmon and trout.

The maximum instantaneous water requirement for Phase II is 9.5 cfs (4,264 gallons per minute [gpm]). This maximum includes process water and water to cool the temperature of the discharge to a temperature below that specified in the existing NPDES permit. Using 25 percent of the 7-day, 10-year Chehalis River flow of 416 cfs (predicted low flow), and conservatively estimating that all the flow comes from the river, at worst case Phase II would withdraw less than 2.3 percent of this flow. Phase I and Phase II together will require a maximum of 19 cfs.

Assuming that 88 percent of this flow is derived from surface water, this equates to 16.7 cfs from surface water, or approximately 4.0 percent of the 25 percent, 7-day, 10-year low flow. Provisional data for the USGS gage near the well field site (12.03050.02, Chehalis River near Satsop) indicate that 16 cfs would equate to a change in river height of 0.02 feet, or 0.24 inches – essentially undetectable. Effects of river stage at this gage are complicated by the significant tidal influence on river level throughout the lower Chehalis River (Ebasco 1978, EnviroSphere 1978). Given the marginal effect on the main stem and the influence of tidal fluctuations, the effects of withdrawals on habitats in the mouth of Elizabeth Creek are expected to be insignificant.

Water for potable uses will be supplied to the plant by the PDA's raw water wells located on the north bank of the Chehalis River east of the confluence with the Satsop River. The maximum anticipated demand for Phase I and Phase II is expected to be 100 gpm (0.2 cfs), and the average use will be less than 40 gpm (0.08 cfs). Given the relatively minor extent of potable water withdrawals, no significant impacts to aquatic resources are anticipated.

Adverse effects on fisheries resources and aquatic habitats from changes in water quantity are evaluated based on measurable effects on the area available for migration, spawning, and rearing, and the secondary effects of flow reduction on water quality, particularly temperature. Given that the proposed total water withdrawals for Phase I and Phase II will not have a significant impact on the baseflow in the Chehalis River or surrounding creeks, and any marginal impact will be overwhelmed by tidal influences, there will be no measurable impact on aquatic habitats. Similarly, while reductions in surface water flow can have adverse effects on stream temperatures a combined incremental withdrawal of 19 cfs for Phase I and Phase II will have no impact in this large, tidally influenced water body (Pinney 2001).

Given these findings, the following conclusions have been reached regarding the predicted effects of Phase II process water withdrawals:

- There will be no significant impacts on aquatic habitats, including wetland and nearshore habitats on the state PHS list.
- There will be no adverse impacts on state or federal endangered, threatened, proposed or candidate species.
- There will be no adverse impacts on other aquatic species.

Process water disposal

Process effluent will be discharged to the Chehalis River through an existing outfall originally constructed for the WPPSS WNP-3 facility. To determine the potential for adverse impacts on

the Chehalis River from effluent discharge, existing modeling and analyses conducted for the Phase I Project were expanded to examine expected effluent concentrations and plume diffusion characteristics from the Phase II process water discharge. Discharges to the river were evaluated in comparison to the water quality criteria specified in WAC 173-201A (Water Quality Standards for Surface Waters of the State of Washington). Phase I and Phase II discharges will be essentially identical in water quality and quantity on average.

The potential impacts of combined Phase I and Phase II discharges to the river were estimated using a mixing equation applied to 25 percent of the flow rate under two flow conditions: the minimum flow of 550 cfs specified by WAC 173-522-020 for the Chehalis River at Satsop (the location of the discharge); and a 7-day, 10-year low flow of 416 cfs for this location (extreme low flow). The extreme low flow conditions were modeled to provide a conservative estimate of water quality conditions under severe environmental conditions. The results of these calculations, along with discharge characteristics, are presented in Table B-5-2. In SCA Amendment #4, the effluent concentrations 100 feet downstream of the diffuser were also estimated by applying a plume model to the existing discharge. Ecology has indicated that a dilution zone will not be allowed in calculation of water quality impacts (Elling 2001). Therefore plume model results were not developed for the combined discharge.

As shown in Table B-5-2, the combined Phase I and Phase II effluent discharge will have negligible effects on water quality in the receiving water at the specified minimum baseflow rate for discharge permitting at this location in the Chehalis River (550 cfs). The results are similarly negligible under extreme low flow conditions (the 7-day, 10-year low flow of 416 cfs), which represent a higher potential for adverse impacts on water quality.

Based on these findings, no adverse effects on surface water quality and aquatic resources in the Chehalis River are expected from the effluent discharge. This conclusion is based on the following:

- Modeling of combined Phase I and Phase II receiving water concentrations indicates that all provisions the existing NPDES permit will be met.
- The combined Phase I and Phase II discharge will meet or exceed all Class A water quality criteria for toxic substances. The receiving water currently exceeds the chronic criteria for lead and zinc. The effluent discharge will not significantly increase concentrations of these constituents in the receiving water.
- The discharge will be subject to NPDES compliance monitoring.

Table B-5-2
Analysis of Combined Phase I and Phase II Effluent Discharge Relative to Water Quality Standards and NPDES Permit Requirements

Parameters	WAC 173-201A Standards ^(a)		NPDES ^(b) Permit	Influent Concentration (Ranney Wells) (mg/L)	Chehalis River Concentration ^(c) 550 cfs (mg/L)	CT Project Discharge Concentration ^(d) (mg/L)	Receiving Water Concentration	
	Acute Criteria (mg/L)	Chronic Criteria (mg/L)					Minimum Flow Concentration ^(e) (mg/L)	Extreme Low Flow Concentration ^(f) (mg/L)
Arsenic	0.36	0.19	NA	0.0025 ^(g,h)	0.0005 ^(g)	0.016	0.00082	0.00091
Cadmium	0.00084	0.00037	NA	0.00005 ^(g,i)	0.00005 ^(g)	0.00032	0.00006	0.00006
Chromium ⁺³	0.63	0.075	0.1 ^(j)	0.0005 ⁽ⁱ⁾	0.0006	0.00635	0.00072	0.00075
Copper	0.00476	0.00354	0.03	0.0005 ^(g,i)	0.0005	0.00635	0.00062	0.00066
Iron	NA	NA	1	0.008 ⁽ⁱ⁾	0.107	0.1016	0.10689	0.10686
Mercury	0.0024	0.000012	NA	0.0001 ^(g,i)	0.0004	0.00064	0.00040	0.00041
Nickel	0.473	0.052	0.065	0.0005 ^(g,i)	0.0005 ^(g)	0.00635	0.00062	0.00066
Lead	0.0116	0.00045	NA	0.00005 ^(g,i)	0.0005 ^(g)	0.00032	0.00050	0.00050
Selenium	0.02	0.005	NA	0.001 ^(g,i)	0.001 ^(g)	0.0064	0.00111	0.00114
Temperature (°F)	NA	64.4	68	51 ⁽ⁱ⁾	52.3	68 ^(k)	52.6	52.7
Zinc	0.0365	0.0331	0.0025	0.0025 ^(g,i)	0.0025 ^(g)	0.03175	0.00310	0.00328

- (a) Acute: In general, refers to a 1-hour average concentration not to be exceeded more than once every three years on the average.
Chronic: In general, refers to a 4-hour average concentration not to be exceeded more than once every three years on the average.
- (b) NPDES permit (effluent limitations, recalculating cooling water blowdown).
- (c) Chehalis River at intake area (Envirosphere 1982)
- (d) For constituents stipulated in the NPDES permit only, CT Project discharge concentration - assume 12.7 increase at point of discharge into blowdown line.
CT Project discharge of 2.86 cfs (1280 gpm) based on preliminary water balance assumptions for combined Phase I and Phase II discharge.
For constituents not stipulated in the NPDES permit, a concentration factor of 6.4 was used.
- (e) Receiving water minimum flow rate is the minimum base flow rate specified by WAC 173-522-020 in Chehalis River at Satsop
Receiving water concentration = $\frac{(\text{CT Project Discharge} \times 2.86 \text{ cfs}) + (\text{river concentration} \times 550/4 \text{ cfs})}{2.86 \text{ cfs} + 550/4 \text{ cfs}}$
- (f) Receiving water low flow rate is the combined 7-day 10-year low flow in Chehalis River at Porter and Satsop River at Satsop (416 cfs).
Receiving water concentration = $\frac{(\text{CT Project Discharge} \times 2.86 \text{ cfs}) + (\text{river concentration} \times 416/4 \text{ cfs})}{2.86 \text{ cfs} + 416/4 \text{ cfs}}$
- (g) Based on estimated values calculated to equal 1/2 non-detectable analytical limit.
- (h) Ranney Well water data (WPPSS).
- (i) Well APW (5 Nov, 1980 - 29 Oct 1981) mean annual dissolved concentration (all ND = 1/2 detection limit) (Envirosphere 1982)
- (j) NPDES permit limitation for chromium.
- (k) The temperature at the point of discharge will be maintained at or below 18°C (68°F) by the addition of quench water, as required by the existing NPDES permit which states the following:
“The discharge temperature shall be such that the applicable Water Quality Standards for temperature shall be complied with at the edge of the dilution zone. Temperature shall not exceed 18.0 degrees Centigrade. The temperature increases shall not, at any time, exceed $t=28/(T+7)$, as described in WAC 173-201A-030 for Class A waters. For purposes hereof, “t” represents the maximum permissible temperature increase measured at a mixing zone boundary and “T” represents the background temperature as measured at a point unaffected by the discharge and representative of the highest water temperature in the vicinity of the discharge. When natural conditions exceed 18.0 degrees Centigrade, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3 degrees Centigrade.”

B-5.1.3 Mitigation Measures

No mitigation measures are necessary to address adverse impacts from process water withdrawal and disposal. Maintenance wastewater will be discharged under NPDES guidelines and solid waste and toxic waste produced on the site (i.e., used lubricants) will be disposed of according to state and federal regulations. Storage and use of petroleum products will be controlled and trained personnel will be equipped to respond to large and small spills.

B-5.2 WILDLIFE HABITATS AND RESOURCES

In this section, the habitat resources and wildlife within the vicinity of the Phase II study area are described. This description includes identification of habitat types present in the vicinity, identification of typical wildlife species that occur in the area, and identification of endangered, threatened, proposed, and candidate species for protection on state and federal species lists.

The areas defined below describe the plant site and the study area applicable to the wildlife studies conducted for the project.

- The plant site is defined as the construction site upon which the proposed plant will be built. This site was used as a construction laydown area remaining from the previously built WPPSS WNP-3 facility. The site has been graded several times, is scarcely vegetated, and is covered in gravel.
- The study area is defined as the proposed plant site and 500 feet around it. The study area provides a basis for describing existing conditions within a regional context.

Habitat surveys were conducted during winter (January 1994) and spring (May and June 1994) to document existing habitat conditions at the proposed plant site and in surrounding areas (WPPSS 1994). Surveys completed in 1994 were for the Phase I project (which included the study area for the Phase II project), as well as the pipeline corridor, and the transmission line corridor (which were part of Phase I only). To supplement information obtained from the 1994 surveys, current WDFW PHS maps were consulted to identify species and habitat areas of concern occurring in the study area vicinity. In addition, a bald eagle survey was conducted in February 2001 to determine the presence or absence of bald eagle nesting habitat within 0.5 mile of the Phase II study area. Prior to the survey, WDFW biologists were contacted for information about nest sites and bald eagle activity near the study area not otherwise indicated on the PHS maps.

Habitat types and typical wildlife species occurring in the vicinity of the Phase II study area are described below.

B-5.2.1.1 Affected Environment and Wildlife Resources

As discussed in prior WNP-3 sections, the Phase II site was previously developed for construction of the WPPSS facility, and has remained in a highly disturbed condition that provides little habitat for wildlife species. The area surrounding the Phase II site consists of several habitat types, including developed land, coniferous forest, regenerating coniferous forest, grassland, and shrubland.

There are 148 species of birds that potentially occur within habitats in the vicinity of the study area and adjacent lands (DeGraaf et al. 1991). Of these, 46 species are most likely to occur in forest habitat, 25 in shrub habitat, 31 in open agricultural areas and grasslands, and 46 in wetland, riparian, and aquatic habitats. Approximately 75 of the bird species are year-round residents, 45 are summer breeding residents, 23 are winter residents, and 5 occur only during spring and/or fall migration periods. A total of 32 species of mammals potentially occur within habitats traversed by Phase I of the project, with a smaller total utilizing the area immediately adjacent to Phase II. Small mammals, including rodents, shrews, bats, and rabbits are the most numerous although they are not readily observed. Large mammals include deer, elk, coyotes, and black bears.

Habitat types and typical representative species occurring in the vicinity of the Phase II study area are described below. Information on special status species (i.e., state and federal species of concern) is provided in the following sections.

Habitat Areas and Representative Wildlife Species

Developed: Although there are varying levels of development, these areas generally provide low-quality habitat because of the lack of native vegetation and the level of human disturbance. Species observed in developed areas during field reconnaissance in 1994 included European starlings, rock doves, American crows, house sparrows, and opossums, all of which are highly adapted to human-modified environments.

Coniferous forest: Forest habitat in the study area vicinity is predominated by coniferous with some associated deciduous tree cover, and forest understory vegetation. Coniferous forest is the predominant habitat in the areas around the study area to the northeast, south past the transmission lines, and immediately to the east of the project site. Deciduous and mixed forest occurs in smaller patches, generally interspersed with dense coniferous stands.

The quality of forest habitat for wildlife varies depending on the age or successional stage of the stand, the presence of several vegetative layers (i.e., shrub/midstory and herbaceous/understory vegetation), the presence of snags and downed logs, and the size of the stand. A stand along Fuller Creek on the PDA property is over 80 years old and is classified as mature coniferous forest. This stand is defined as a "Preservation Area" and is being managed to create structural characteristics of old-growth forest. The intent of the management is to provide thermal cover for deer, habitat for cavity-nesting wildlife such as pileated woodpeckers, and large snags for raptor nesting and perching.

Wildlife occurring in forest habitat in the study area is typical of wildlife occurring in second-growth forest stands throughout western Washington. Common forest songbirds observed in the 1994 surveys throughout the study area included Pacific slope flycatchers, Steller's jays, chestnut-backed chickadees, red-breasted nuthatches, brown creepers, winter wrens, golden-

crowned kinglets, varied thrushes, solitary vireos, Townsend's warblers, Wilson's warblers, western tanagers, and black-headed grosbeaks. Sign of black-tailed deer, mountain beaver, and Douglas' squirrel also was observed in many forested areas.

Regenerating coniferous forest: Regenerating coniferous forest is defined as areas that were clearcut up to 20 years ago and where successional advancement is moving rapidly toward forest development. For the first few years after clearcutting, these stands are dominated by a mix of forbs, ferns, and shrubs, such as salal, Oregon grape, trailing blackberry, vine maple, sword fern, bracken fern, and red alder. The diversity of plant species is higher in regenerating stands than during later stages of forest succession because the open space following clearcutting allows many plant species to invade. Within 5 to 10 years after clearcutting, the conifer seedlings (primarily Douglas fir) become the dominant vegetation. Herbs, ferns, and shrubs become overtopped by young trees and often die under the taller growing species. By age 20, the stands have developed closed canopies and are classified as forest habitat. Regenerating forest is interspersed with forest habitat in the study area.

Many wildlife species are found in regenerating forest stands since the variety of plants and seeds provides an abundance and diversity of food. The young plants are fairly palatable, are accessible to ground-foraging animals (i.e., deer), and provide hiding cover for songbirds and other wildlife. Wildlife commonly observed in regenerating coniferous forest during the 1994 field surveys included ruffed grouse, mourning doves, rufous hummingbirds, Swainson's thrushes, orange-crowned warblers, MacGillivray's warblers, Wilson's warblers, rufous-sided towhees, song sparrows, white-crowned sparrows, dark-eyed juncos, and American goldfinches. Red-tailed hawks occasionally were observed circling over the open stands. Sign of coyote, black-tailed deer, and elk was observed within regenerating forest habitat and on logging roads through the regenerating stands. Garter snakes were common along the edges of logging roads. Mountain beaver sign also was prevalent throughout many of the stands.

Grassland/agricultural: Grasslands and agricultural areas include pastures, croplands, orchards, hayfields, and untended fields. Some of the low-lying fields become flooded during winter and provide habitat for numerous species of waterfowl where they rest and feed on grains. Species observed in flooded fields near the Chehalis River during the 1994 field surveys included trumpeter swans, Canada geese, mallards, northern pintails, American wigeons, green-winged teal, common goldeneyes, killdeer, and common snipe. Open areas also provide foraging habitat for raptors. Red-tailed hawks and northern harriers occur year-round in open agricultural areas. American kestrels occur in open areas in the study area during winter. Songbirds occurring in this habitat type include violet-green swallows, savannah sparrows, and American robins.

Shrubland: Shrub habitat is the primary habitat type in existing rights-of-way for the BPA transmission line to the south of the project site. Shrub habitat is not a forest successional stage.

Shrub habitat is dominated primarily by Scotch broom, but also includes trailing blackberry, Himalayan blackberry, salmonberry, thimbleberry, and young red alder. This habitat may be utilized by several of the bird and wildlife species listed above for foraging and other uses. In general, the predominance of invasive plant species limits shrubland habitat value for many native bird and animal species.

Migration routes: The vicinity of the Phase II study area is located on a general migration route for waterfowl on the Pacific flyway. Concentrations of waterfowl, including Canada geese, mallards, gadwalls, pintails, wigeons, shovelers, and teal, may transit the area during seasonal migrations, and utilize aquatic habitats in the Chehalis River and its flood plain. Seasonally flooded fields along the Chehalis River provide wintering habitat for over 10,000 wigeons, mallards, pintails, and buffleheads, 250 Canada geese, and 80 trumpeter swans (WDNR 1994, 2001). Concentrations of migratory waterfowl are protected at the state level as sensitive species aggregations, and at the federal level under the Migratory Bird Treaty Act.

Special Status Species

Special status species refer to those species currently listed or under consideration for listing under the federal ESA, and/or are protected or are under consideration for protection at the state level. Two species occurring or potentially occurring in the vicinity of the Phase II study area, bald eagle and northern spotted owl, currently listed as threatened under the ESA. Two other species, streak horned lark and the western pocket gopher, are currently candidate species for listing under the ESA. There are several additional species federally listed as species of concern, as well as species listed at the state level. Special status species occurring or potentially occurring near the vicinity of the study area are listed in Table B-5-3. Specific information on federally listed species is provided below.

Table B-5-3
State and Federal Species of Concern Occurring or Potentially
Occurring in the Vicinity of the Study Area

Common Name	Scientific Name	Federal Status ^(a)	State Status ^(b)
Yuma myotis	<i>Myotis yumanensis</i>	SOC	-
Long-eared myotis	<i>Myotis evotis</i>	SOC	-
Long-legged myotis	<i>Myotis volans</i>	SOC	-
Keen's myotis bat	<i>Myotis keenii</i>	-	C
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	SOC	C
Mazama (Western) pocket gopher	<i>Thomomys mazama</i>	C	C
Western gray squirrel	<i>Sciurus griseus griseus</i>	SOC	T
Oregon vesper sparrow	<i>Pooecetes gramineus affinis</i>	SOC	-
Pacific Fisher	<i>Martes pennanti pacifica</i>	SOC	E
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	T

Table B-5-3 (Continued)
State and Federal Species of Concern Occurring or Potentially
Occurring in the Vicinity of the Study Area

Common Name	Scientific Name	Federal Status ^(a)	State Status ^(b)
Northern goshawk	<i>Accipiter gentiles</i>	SOC	C
Spotted owl	<i>Strix occidentalis</i>	T	E
Vaux's swift	<i>Chaetura vauxi</i>	-	C
Pileated woodpecker	<i>Dryocopus pileatus</i>	-	C
Olive-sided flycatcher	<i>Contopus cooperi</i>	SOC	-
Willow flycatcher	<i>Empidonax traillii</i>	SOC	-
Streaked horned lark	<i>Eremophila alpestris strigata</i>	C	C
Purple martin	<i>Progne subis</i>	-	C
Western toad	<i>Bufo boreas</i>	SOC	C
Tailed frog	<i>Ascaphus truei</i>	SOC	-

- (a) Current species information derived from the Priority Habitats and Species and Natural Heritage Data Systems (WDFW 2001, WDNR 2001), and USFWS 2001.

SOC = Federal Species of Concern

FT = Federal Threatened Species

PT = Federal Proposed Threatened Species

C = Federal Candidate Species

N/W = Not warranted

- (b) E = State Endangered - A species, native to the state of Washington, that is likely seriously threatened with extirpation throughout all or a significant portion of its range.
T = State Threatened - A species, native to the state of Washington, that is likely to become endangered in the foreseeable future throughout a significant portion of its range within the state without cooperative management or the removal of threats.
C = State Candidate - A species that is under review for possible listing as endangered, threatened, or sensitive.
S = State Sensitive - A species native to the state of Washington that is vulnerable or declining and likely to become endangered or threatened throughout a significant portion of its range within the state without cooperative management or removal of threats.

Bald eagle: Bald eagle are currently listed as threatened under the ESA by USFWS. Eagle are present in the general vicinity of the project area, and regularly forage in habitats associated with the mainstem of the Chehalis River to the north. The closest mapped bald eagle nests are approximately 1.5 miles northeast of the Phase II study area. The location and status of these nests were confirmed by personal communication with the WDFW area biologist (Zahn 2001). Also confirmed was that there are no known bald eagle nests within the study area boundary, or in the immediate vicinity (Zahn 2001). The field survey found no bald eagles or bald eagle nests within 0.5 mile of the study area.

Northern spotted owl: Northern spotted owls are currently listed as threatened under the ESA by USFWS. Spotted owl are known to be old-growth obligates, meaning they have specific

habitat requirements which generally limit their range to old growth forest regimes. As mentioned in previous sections, the Phase II site was cleared and graded in preparation for previously planned development, and the surrounding area has a history of extensive timber harvest. As a consequence, there is no old growth forest habitat within the study area. However, WDFW PHS maps do identify a spotted owl circle in the general project vicinity in association with woodland habitat. (Spotted owl circles are protected habitat zones defined as part of the ESA recovery plan of 1.8-mile radius around identified nesting areas.) The outer boundary of this circle is several miles from the Phase II study area.

B-5.2.2 Evaluation of Adverse Impacts

Construction of Phase II will not result in any loss or degradation of existing habitats in the study area. As discussed in previous sections, the site was previously cleared and developed for construction of the WPPSS WNP-3 facility, and has essentially no habitat value for wildlife. Existing roads and access points will be used during construction, and no new roads or right-of-ways will be developed as part of Phase II development. Indirect impacts from human activity and noise generated from construction of the plant will result in temporary disturbance of wildlife in immediately surrounding habitat areas. Wildlife tends to habituate, so only minor impacts are expected to occur.

Noise in the wildlife area to the east of the Satsop CT Project site will increase from 61 dB(A) with Phase I operating, to 75 dB(A) with both plants in operation. This is a considerable increase in noise, however given the scarcity for definitive criteria for noise level impacts to wildlife and the assumption that wildlife tends to habituate, the increase in noise from the addition of Phase II is not likely to permanently impact wildlife in the surrounding areas.

WDFW management recommendations for noise impacts on wildlife (based on a WDF report by Milner and Roderick 1991) include a site-specific approach to designating buffers for bald eagle nests. In general, buffers for active nests range from 1,300 to 2,600 feet (0.25 to 0.5 mile) during the nesting period (January through August 15). Because no bald eagle nests were identified within 0.5 miles no additional buffer areas are seen to be necessary.

No special wildlife use areas, such as fawning areas, seasonal congregation areas, or critical seasonal use habitats adjacent to the study area are documented in available data and information, and none were noted during field surveys. However, undetected fawning areas may exist. Construction and maintenance vehicle traffic may cause mortality among some individual animals as they cross the access roads. These impacts generally will affect a very small percentage of the existing animal populations, and therefore the impacts will not be significant.

B-5.2.3 Mitigation Measures

Because the plant site was previously developed and no new utility corridors are required for Phase II, there will be no impacts to vegetation or wildlife from the construction or operation of Phase II. Therefore no mitigation measures are necessary for wildlife species and habitats in the vicinity of the site.